



SMITHSONIAN Zoogoer

For members of **FRIENDS OF THE NATIONAL ZOO**

JULY | AUGUST | 2013

Damas in Danger

Can the largest and rarest
gazelle outrun extinction?

- » Elephant Road Trip
- » Animals Worth Finding
- » Prickly Prehensile Porcupine



Good day.

Great day.

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FEATURES

Brown Beauty

Dama gazelles' subtle beauty delights discerning eyes. Their social structure and critically endangered status have spurred scientists to attempt groundbreaking new approaches to managing and conserving herd animals.

BY BRITTANY STEFF

16 Hidden Gems

BY PHYLLIS MCINTOSH

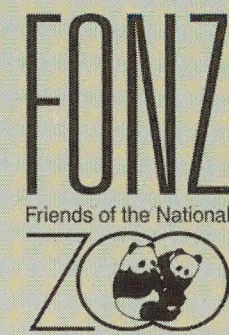
Wander off the beaten track at the Zoo and discover a flock of offbeat and intriguing animals you might once have overlooked.

22 Elephant on Board

BY CRISTINA SANTISTEVAN

How do you move a five-ton animal 1,100 miles? Slowly and carefully, while always reminding yourself to expect the unexpected.

SMITHSONIAN Zoogoer



is the dedicated partner of the Smithsonian's National Zoological Park. FONZ provides exciting and enriching experiences to connect people with wildlife. Together with the Zoo, FONZ is building a society committed to restoring an endangered natural world. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital.

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Membership in FONZ supports the animal care, conservation, and educational work of the Smithsonian's National Zoo. It also offers many benefits: a *Smithsonian Zoogoer* subscription, discounts on shopping and events, discounted or free parking, and invitations to special programs and activities. To join, call 202.633.2922, or visit fonz.org/join.

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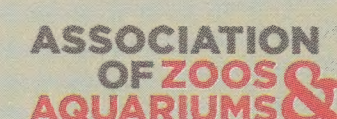
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On the cover: Dama gazelles are Africa's largest and rarest gazelles. PHOTO BY MEHGAN MURPHY/NZP



The Smithsonian's National Zoo is accredited by the Association of Zoos and Aquariums.



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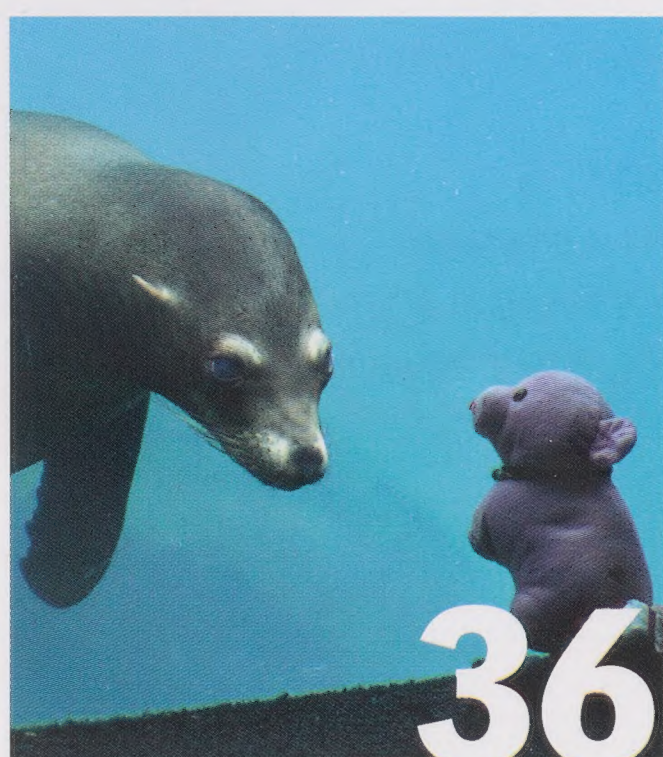
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Who's watching whom? That's the question raised by a stunning image from American Trail.



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NOBLE ELEMENTS, NOBLE EFFORTS

“TREES ARE NOBLE ELEMENTS TO BE PROTECTED BY SUCCESSIVE GENERATIONS AND ARE NOT TO BE NEGLECTED OR LIGHTLY DESTROYED.” Those stirring words come from the last will and testament of Mildred Bliss, the philanthropic force behind the magnificent gardens at Dumbarton Oaks.

Here at the Smithsonian's National Zoo, we share these sentiments. In addition to the great care that we provide our animals, we also tend carefully to the natural beauty of the Zoo.

Conserving the natural setting of our park was a key goal as we completed American Trail and the Elephant Community Center. These wonderful new exhibits required protecting and resculpting the Zoo landscape. Remarkable care was taken to preserve the beauty of the park by saving trees wherever possible and replacing those that had to be removed—not lightly!—for construction. This planning and effort resulted in the planting of 200 new trees, some as tall as 25 feet. In time, the Zoo's canopy will be fully restored.

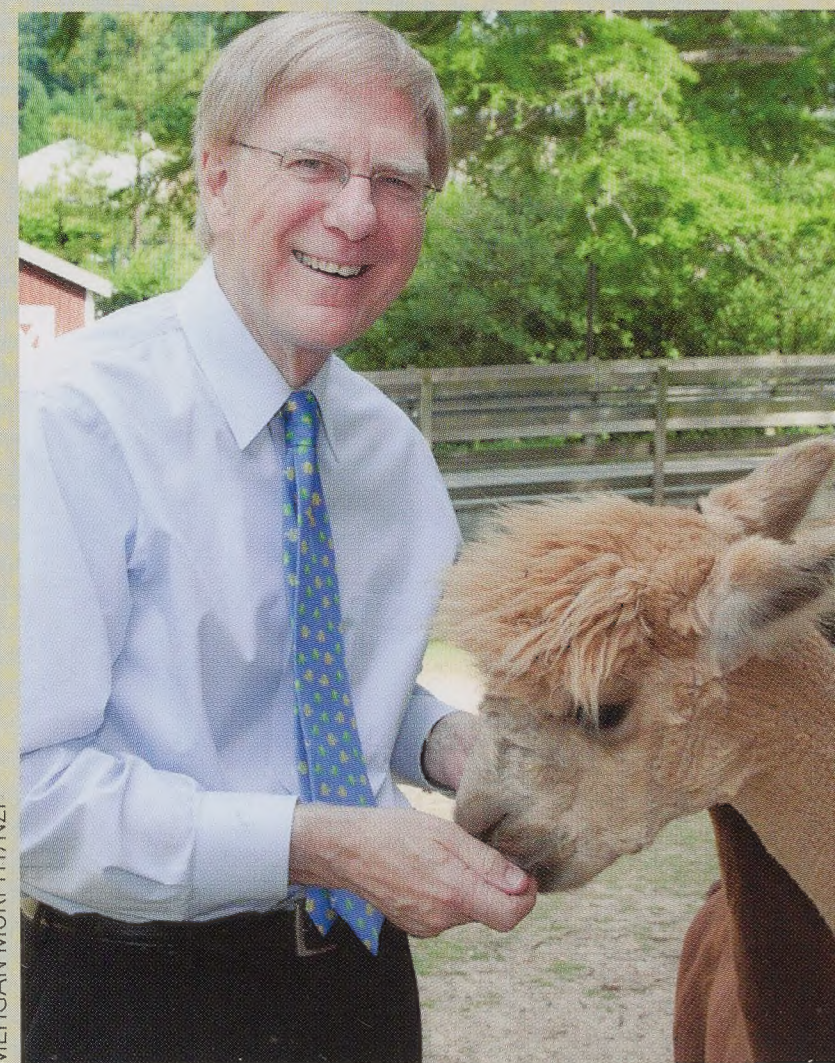
This work of beautifying the Zoo and preserving the land on which it sits is in keeping with the Zoo's origins and its best traditions. In the summer of 1889, the Smithsonian created the Zoological Park Commission to find a suitable, permanent site to house bison and other endangered animals, then quartered temporarily on the Mall. Samuel Langley, then the Secretary of the Smithsonian, appointed William Temple Hornaday to find a location for the Zoo. Along the banks of Rock Creek, he found such a site, our home to this day. Frederick Law Olmsted, the premier landscape architect of the era, created the design for the Smithsonian's National Zoo.

Today our 163-acre site, which houses some 2,000 animals and a dozen major exhibits, is a real national treasure—nurtured, matured, and grown for more than a century. When you visit, I hope you'll enjoy the seals, sea lions, and other North American species, and visit Bozie, our newest elephant, and our bear cubs. But please don't stop there. Take a moment to look around and appreciate the natural world that surrounds you here. It's a special place.

Sincerely,

Bob Lamb

Executive Director, Friends of the National Zoo



MEGHAN MURPHY/NZP

BEYOND ROCK CREEK



MEHGAN MURPHY/NZP

WE PROVIDE ENGAGING EXPERIENCES WITH ANIMALS AND CREATE AND SHARE KNOWLEDGE TO SAVE WILDLIFE AND HABITATS.

Those 16 words are the Smithsonian's National Zoo's mission statement. And, while the first half of that statement is most visible to our guests and FONZ members, it's the second half of our mission I want to focus on today.

We create and share knowledge on six continents, in more than 30 countries. From the hills of Virginia to the plains of Africa, our experts work to unravel the secrets of endangered species and essential habitats in pursuit of vital conservation solutions.

I am proud to say that our scientists were among the founders of conservation biology, and continue to be leaders in the field to this day. Over the years, we have tracked tigers in Nepal; established breeding colonies of endangered frogs in Panama; and tagged migratory birds in Texas. Recently, two of our scientists spent two weeks counting frogs and measuring tadpole tails in Peru. Our field projects—past and present—are too numerous to list in this letter. In the past 12 months alone, we have led, sponsored, or supported more than 70 research and conservation projects around the world.

In Morocco, for example, a team of Smithsonian experts is developing a reporting system that may help reduce the impact of future wildlife disease outbreaks on endangered species, including the dama gazelle (profiled on page 10 in this issue). In India, our researchers recently completed a project that proves forest corridors—strips of forested land that link otherwise unconnected forests—are actually being used by tigers and leopards to reach new territories and breeding partners. And here in North America, Smithsonian-bred black-footed ferrets are being reintroduced to their historic range from Canada to Mexico. Twenty-five years ago, our biologists celebrated the arrival of the very first black-footed ferrets at our Front Royal facility. Now, a quarter-century later, we continue to be leaders in the effort to save one of North America's rarest mammals.

Our scientific work doesn't stop when the fieldwork is done. Researchers bring data and samples back to our Front Royal and D.C. facilities where they run laboratory tests, analyze results, and discover insights that will guide future research projects and conservation decisions. We know that our science—both in the field and back at home—is helping save species, protect habitats, and prevent extinctions around the world.

Closer to home, our fieldwork provides insight into animal care and habitats here at the Zoo. You'll find information about our scientists and their work on Elephant Trails, around the Great Cats exhibit, along Asia Trail, and elsewhere throughout the Zoo. In this way, every time you visit us at the National Zoo, it's as if you are taking a trip around the world with our scientists!

Sincerely,

Dennis Kelly

Director, Smithsonian's National Zoological Park



DANIEL REIDEL

Counting Wildlife at the Zoo

We know how many lions, tigers, and bears live at the Zoo, but the number and type of wild critters who make their homes here is less certain. Now, Zoo visitors can help identify and census populations of wild plants and animals at the Rock Creek campus with the new Smithsonian's National Zoo Bioinventory project, hosted on the iNaturalist website. All you need to participate is internet access and a digital camera or smartphone. Free mobile apps are available for both iPhone and Android.

Learn more at inaturalist.org/projects/smithsonian-s-national-zoo-bioinventory.

Zoo Receives Eco-Accolades



National Geographic recognized the Smithsonian's National Zoo as one of seven energy-smart zoos and aquariums. The Zoo's commitment to energy conservation is most recently expressed through the newly-opened Elephant Community Center, which employs geothermal wells for heating and cooling, features operable skylights, and is topped with a green roof.



JIM JENKINS

MEGHAN MURPHY/NZP

2013 Best Season Yet for Mad Island Bird-Banding Project

May 13 marked the end of what many participants called the best season in 20 years of continual research at The Nature Conservancy's Mad Island Preserve in Texas. Over the course of the 8-week field season, researchers from the Smithsonian Migratory Bird Center collected data from a total of 3,160 birds representing 84 different species.

Each bird was recorded, checked for signs of ticks and disease, measured, weighed, and equipped with a light-weight leg band before being released to continue its migration northward.

Results from the field season will increase scientists' understanding of migratory bird behavior and ecology, and may offer guidance for future conservation programs.



GUNNAR KRAMER/SMBC

Panda Cams to Receive Upgrade

THANKS TO A GENEROUS DONATION FROM THE FORD MOTOR COMPANY FUND, the Zoo's panda cams will soon be compatible with all iPad, tablet, and smartphone devices. These upgrades will allow us to offer higher quality video for viewers. We are also adding two HD den cameras, with more to come!

View all of the Zoo's animal web cams online at nationalzoo.si.edu/Animals/WebCams.



DANIEL REIDEL



JANICE SVEDA

Sloth Bear Cub on Exhibit

Hank explored his new exhibit space for the very first time June 17, and has been delighting staff and visitors with his playful personality ever since. Zoo visitors can watch the cub's antics most mornings at the sloth bear exhibit on the Asia Trail. The cub and his mother, Hana, will be out in their exhibit space every day, 8:30–10:30 a.m., as weather permits.

COURTNEY JANNEY/NZP

Mark Your Calendar

August 7 **Gorilla Day**

Speak with keepers and Zoo scientists at this free family-friendly event, which offers educational and fun activities for children and adults, keeper talks, and animal demonstrations at the Great Ape House.

August 24 **African Wildlife Day**

Join us at the Cheetah Conservation Station to learn about African wildlife and to find out what the National Zoo is doing to preserve these amazing animals.

Sept. 7 **Sloth Day**

Turn your world upside down at the National Zoo's Sloth Day event. Visit the Small Mammal House during this fun family-friendly event to learn all about sloths and their habitats.

Sept. 29 **Fiesta Musical**

Celebrate Hispanic Heritage Month at the Zoo's fiesta. Enjoy animal demonstrations, Hispanic music, costumed dancers, traditional crafts, and Latin American food. Free and open to the public.

Ferret Births

It's summertime, which means Front Royal is again celebrating the births of many black-footed ferret kits. The first 5 kits of the season were born on April 9. Since then, another 10 litters have been born, for a total of 44 kits as of July 1. Black-footed ferrets are one of the rarest mammal species in the United States, and are listed as endangered on the U.S. Endangered Species List. Since 1988, the Smithsonian's National Zoo and Smithsonian Conservation Biology Institute have collaborated with federal, local, and private groups to breed ferrets in captivity and reintroduce their offspring into the wild. Over the past 25 years, SCBI-Front Royal has contributed hundreds of ferrets to the wild reintroduction program. Today, approximately 500–1,000 black-footed ferrets live wild in North America.





Fishing Cat Birth

Almost exactly one year after the birth of her first two kittens—Namfon and Cutter—fishing cat Electra became a mom again. The newest fishing cat on Asia Trail was born just before midnight on May 17, and is doing well. Mom and kitten are currently off exhibit, but are expected to return to their public exhibit space by late summer. In the meantime, visitors can see the kitten's father, Lek, on Asia Trail.



Exclusive Behind-the-Scenes Reptile Discovery Center Tour

Eat breakfast with the crocodiles, share a snack with an Aldabra tortoise, and explore behind-the-scenes in the Reptile Discovery Center and the new Salamander Lab.

Each tour is limited to 10 people. Tours start at 9 a.m. and last approximately two hours. Due to the nature of this tour, we cannot accommodate children under the age of 4.

Tickets are \$95 each. FONZ members receive a free gift with ticket purchase; just enter your member number at the time of purchase. All proceeds will benefit a new salamander exhibit—Jewels of Appalachia—which will house eight to 10 species of Appalachian salamanders.

Upcoming tour dates:

August 7
August 10
August 21
August 24
September 11
September 14
September 25
September 28
October 9
October 12
October 23
October 26

Visit fonz.org/salamanders for additional tour dates, more information, and to purchase your tickets.

CHRIS CROWE/NZP



BROWN beauty

BY BRITTANY STEFF

Elegant and endangered, dama gazelles have inspired pioneering techniques in animal care and conservation science.

Dama gazelles aren't the flashiest animals at the Smithsonian's National Zoo. They don't have extravagant markings, such as spots or stripes, nor do they sport striking hairdos. Yet they are graceful and lovely, with lithe bodies and limpid eyes.

Still, many zoogoers probably don't see a dramatic difference between the gazelles and the white-tailed deer living



MEHGAN MURPHY/NZP



JEN ZOON/NZP

Mellow Moods

Dama gazelles are a prey species, which means they are strongly inclined to bolt at the first sign of trouble. But keeper Gil Myers, who has worked with gazelles for more than ten years, reports that dama gazelles are more laid-back than any other gazelle species with which he's worked.

Not that they're placid. "They have their moments, and you still have to be careful around them," Myers says. "But overall they're much less flighty and much calmer than other gazelles."

Their calm disposition has some very tangible benefits: Dama gazelles breed relatively well in zoos. Five calves have been born at the National Zoo, three of which lived on to thrive in adulthood.



JESSIE COHEN/NZP

wild in Rock Creek Park. As their curator, Tony Barthel, notes, “It’s easy for people to dismiss them as another brown, deer-like animal.”

But that would be a shame and a pity. Because, if you look twice, dama gazelles are one of the most remarkable species at the Zoo in terms of both sheer charisma and their role in the Zoo’s scientific research and conservation work.

Outrunning Extinction?

Dama gazelles, sometimes called addra gazelles, are native to the vast Sahara and the arid grasslands, known as the Sahel, that lie to its south. Like almost anyone given a choice, they prefer grassland to desert, though they can survive in both.

The gazelles’ sleek bodies are engineered for survival. Long legs enable them to run at bursts of up to 30 miles an hour; rapid flight is the gazelles’ main defense against predators. Those long legs—and necks too—also help the animals reach tasty tree branches.

Dama gazelles’ diets are adapted to Sahelo-Saharan life. They are browsers, eating a variety of vegetation. This flexibility comes in handy in a dry environment, where food may be sparse. Desert dwellers can’t afford to be picky eaters.

Despite this flexibility, dama gazelles’ numbers are dwindling. A century ago, they were widespread across the entire Sahelo-Saharan region. Then their numbers started to fall, due to habitat loss and overhunting. Their range contracted toward the center of the African continent like a puddle drying in the desert sun.

Experts estimate that between 200 and 300 dama gazelles remain in the wild, in isolated pockets in Chad and Niger. That ranks them as critically endangered on the Red List of Threatened Species maintained by the International Union for Conservation of Nature. A number of conservation groups are setting up nature reserves and working to save the few remaining wild populations. After all, it’s much easier to save a species in its natural habitat than to reintroduce an animal once it’s gone.

Two Herds Are Better Than One

With such small populations clinging to survival in isolation, any chance event—a storm or a sickness—could drive the whole species to extinction. To avert just such a fate, conservationists are eager to keep a healthy population in zoos.

About 130 dama gazelles live in zoos accredited by the Association of Zoos and Aquariums. They’re breeding well, but reproductive scientist Budhan Pukazhenthithi cautions that the species is not out of the woods. Sometimes animals that are a match genetically don’t pair well behavior-



MEGHAN MURPHY/NZP

ally. And sometimes it’s logistically difficult to move individuals around to foster genetic diversity.

Pukazhenthithi says that’s when it pays to have already done your research. He and a team of scientists from the Zoo’s Smithsonian Conservation Biology Institute (SCBI) are working to collect semen from male dama gazelles; freeze, preserve, and thaw that semen; and manipulate the hormone cycles of females. Each of these steps is an important part of the artificial insemination (AI) process.

“Semen collection and AI are excellent tools to have, especially the ability to collect semen from animals in the wild,”

Pukazhenthithi explains. “It means you can preserve the genetic material in the long run, introduce new genes into captive populations via AI, and safeguard the genes of animals selected for reintroduction into the wild. If, due to bad luck something happens to them all, they’re not entirely lost.”

This research demands close collaboration between the Zoo’s Rock Creek and Front Royal campuses. Three female dama gazelles live at Rock Creek, and a bachelor herd of males lives in Front Royal. The unique ability to move gazelles back and forth between the two sites gives the program an almost unprecedented flexibility.

“One of the challenges in managing any small population is the males,” Barthel explains. “You can’t keep them with the herd, because you’d run into trouble after a while. We can send males out to Front Royal and bring others back here. It’s been really convenient.” Such flexibility may be vital to the future of the species.

Big Herds, Big Spaces

Unfortunately, such flexibility is almost as rare as dama gazelles themselves. Many people don’t find dama gazelles to be as obviously charismatic as some other animals, such as lions and zebras. As a result, they’re being slowly excluded from many zoos.

Dave Wildt, head of the Zoo’s Center for Species Survival, explains, “No one puts these animals in traditional zoos anymore. For the dama gazelle, which is critically endangered in the wild, there’s a big demand for reintroduction. Where are those animals going to come from? For zoos, where are the animals going to come from to educate and inspire the public? Where are the animals to supply biologic and reproductive information going to come from?”

The issue is not that zoos don’t produce enough calves. It’s that these calves live in an environment drastically different from the Sahel, and typically grow up around only their mother and perhaps another female or two. “Traditional urban zoos produce one calf here and one calf there, which are exposed to thousands of people every day,” Wildt says.

That's where the Conservation Centers for Species Survival (C2S2) comes in. C2S2 is made up of the National Zoo and five other institutions with significant tracts of open land. Their shared goal is to find new ways to create sustainable populations of important conservation species, including dama gazelles, scimitar-horned oryx, addaxes, and sable antelope. The undertaking is called the Big Herds Project.

Zoos typically can accommodate only two or three of these animals. C2S2 institutions, on the other hand, have room for large herds to live in pastures and social environments that mimic their lifestyle in the wild.

"We'll have big herds in big spaces," Wildt says. "Calves will be born in pastures, so right from day one they are introduced to mom and dad and aunties, and are learning to graze. They'll have same-age cousins. They'll develop social skills, and they'll be more fearful of humans, which is a really good trait for reintroduction."

Scientists will rotate males through natural herds with an eye to maintaining the genetic diversity of each group. Rather than having a male assigned to them by humans, female gazelles will be able to choose their own mates, which may benefit the whole species.

"The females will be involved in mate selection," Wildt explains. "That alone may increase the genetic quality of the calves, because mom is the one who selects who dad is, instead of us doing it with computers."

Screening the Genes

Of all the dama gazelles in human care, up to a third have dubious pedigrees. Scientists don't know their exact parentage. Having all those unknowns in the equation makes it difficult for scientists to maximize genetic diversity and minimize inbreeding.

Historically, geneticists have studied genetic markers (sections of genes) to compare individuals and see if they are significantly different. This tactic usually works, but is chancy if a population is already inbred. The Zoo may be changing that, though.

Through a new technology called next-generation sequencing, scientists

can sequence entire genomes more efficiently and economically than ever before. Many genomes already sequenced belong to the usual suspects of study animals: rats, chickens, zebra finches, cows, dogs, and cats.

SCBI proposes to sequence the entire genome of the dama gazelle, thereby gleaning vital information for conservation. Geneticist Jesus Maldonado is leading the project.

"We know very little about the genetic variability of zoo gazelles and antelopes," Maldonado explains. "We have always looked at gene variations, but we've only sequenced very short fragments. Now what we're able to do is get sequences from the whole genome and map it, and that's incredibly powerful."

Once scientists have mapped the genome, they will be able to study not only

genetic variability, but also how the dama gazelle population has adapted to life in human care and to disease. According to Maldonado, "This will be groundbreaking for zoos."

The Zoo has just received funding for this project and plans to begin working on the dama sequencing soon.

Holding Out Hope

Not every animal is as charismatic as a giant panda. But the sloe-eyed, graceful, and beautiful dama gazelle is an amazing animal and a favorite among those who give it a second glance. Its fans include Steve Monfort, the head of SCBI. He is also the chairman of the board of the Sahara Conservation Fund, which works to save dama gazelles and other Saharan wildlife in their natural environment.

"I think they're very charismatic. They're unusual looking; they're very beautiful," Monfort enthuses. "They live and thrive in an extremely inhospitable desert-like environment that would drive humans extinct."

Knowing the dama gazelle's plight better than almost anyone else, Monfort may have the most reason to be pessimistic. This antelope's story echoes that of many species in trouble: dwindling habitat, hunting pressures, lack of public enthusiasm.

Yet Monfort envisions a bright future for these amazing creatures, thanks to the commitment of C2S2 institutions and the hard work, dedication, creativity, and passion of conservation scientists. Indeed, the effort to save dama gazelles may lay out a road map for the saving of other species.

"People always ask me about endangered species: 'What can be done? It seems so hopeless,'" Monfort recounts. "What can be done is that organizations like the Sahara Conservation Fund and zoos like the National Zoo are working to restore and reinforce these animals in the wild. There is no shortage of natural resources, no shortage of land, and no shortage of possibility. It's not a hopeless scenario. We can save these species, and with the right support we will save these species." **SZ**

— Science writer BRITTANY STEFF is an editor for the Zoo's website and veteran Smithsonian Zoogoer contributor.

Zoo Neighbors

Everyone asks: What do the dama gazelles think of the maned wolves in the next enclosure? Keeper Gil Myers replies, "They never seem to be bothered by the maned wolves. When we put new animals in the yard, we don't usually cover up the fence to the maned wolf yard. If the gazelles feel threatened, they usually run away to the other end of the exhibit."

"I've seen the gazelles take notice of the maned wolves, but I've never seen them so upset that they ran away. That could be because they were born in human care; they've never faced a true predator. They will occasionally charge the wolves, but just a bit."

"What's interesting is that when they're in the holding area behind the exhibit, they can occasionally see the cheetahs. When they do, they act alert: They swish their tails, prick their ears forward, and give their alarm call. I've never seen them do that with the maned wolves. Cheetahs and dama gazelles share habitat in the wild, so that could be the reason why."



MEHGAN MURPHY/NZP

DID YOU KNOW?

More than four feet high at the shoulder, dama gazelles are the tallest of all gazelles. They can stand on their hind legs to nibble branches six feet above the ground.



JEN ZOON/NZP

→ HIDDEN ← gems

BY PHYLLIS MCINTOSH

Everyone knows the Zoo's superstars: elephants, big cats, great apes, and those black-and-white bears. But plenty of less famous animals have their own intriguing stories to tell.



CONNOR MALLON/NZP



JEN ZOON/NZP

HOME TO SOME 400 ANIMAL SPECIES,

from ants to zebras, the Smithsonian's National Zoo has a lot more to see than just lions and tigers and bears. The Zoo's lesser known inhabitants include the highest flying bird in the world; a tiny, furry relative of the elephant; an insect that cultivates its own food; and a cat that leaps into the air to catch birds on the wing. Take a tour with us to meet these and other hidden gems. We'll start near the top of Olmsted Walk.

→ CHEETAH CONSERVATION STATION

Some entertaining new African species recently moved into this popular exhibit. The torn-up sod in the yard across from Parking Lot A is the calling card of Roscoe, a *red river hog* 1. He supplements his Zoo chow by digging for roots and grubs. Roscoe shares the yard with two young male *sitatungas* 2—Marley and Silas—marsh-dwelling antelope native to Central Africa.

"Sitatungas have an elongated flat hoof that comes to a point in the front. It reminds you of an elf shoe, and it allows them to walk in muddy areas without sinking in," explains keeper Regina Bakely. Although Roscoe is the boss of the yard, Bakely says, "the mischievous sitatungas occasionally sneak up on him when he's sleeping with his big fat belly in the air and try to poke him with their horns." Such antics have earned them several nips on the hindquarters.

In a neighboring yard with the dama gazelles, check out the *Ruppell's griffon vultures* 3, believed to fly higher than any other bird. They have been sighted at 36,000 feet, the cruising altitude of a jet. An alteration in a body protein allows them to fly efficiently despite the low pressure and scarce oxygen at such heights.



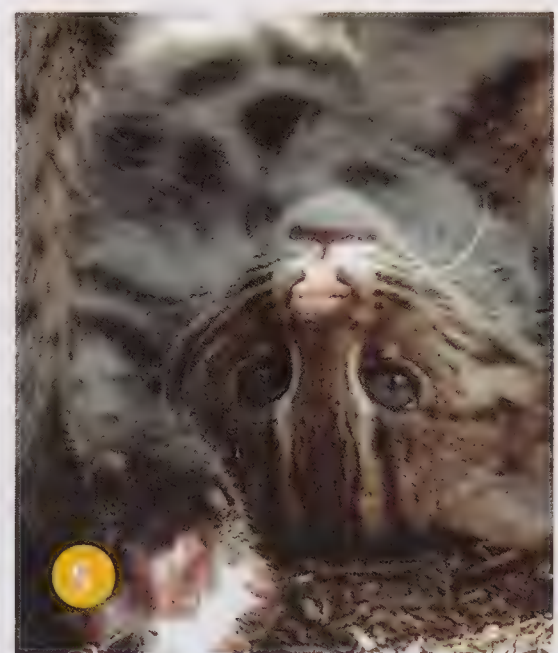
→ **ASIA TRAIL** As others stampede to the giant pandas, we'll stop to appreciate Asia Trail's other bear species, the *sloth bear* 4. Native to India and interested in people, these bears often engage with visitors, sometimes right up at the glass of their enclosures.

"Their unique adaptations for dealing with a diet of insects include a vacuum-like feeding style. They have flexible lips and fleshy nostrils that they can close at will to increase the suction power as they suck termites and ants into their mouths," says biologist Erika Bauer. "Their two front teeth would just get in the way of efficient feeding. So like a lot of children, they are missing those teeth. And their long, shaggy fur keeps biting insects from reaching their skin."

Asia Trail is also home to two well-camouflaged cats, *fishing cats* 5 and

clouded leopards 6. They can sometimes be hard to find in their habitats, but keepers conduct frequent demos to draw them out. When new fish are added to the fishing cat pools, the cats will tap the water to attract a fish and then deftly grab it for a snack. And watching a clouded leopard leap onto the mesh of its enclosure to snag a meatball from a keeper's feeding stick is a special thrill for lucky visitors.

An even more elusive creature can be spotted peering out from under a rock in its watery grotto. It is the *Japanese giant salamander* 7, one of the largest amphibians in the world, capable of growing up to five feet long. Behind the scenes, the Zoo's reptile team is studying the behavior of four other salamanders, a gift from Japan, in hopes of breeding this magnificent species.



JANICE SVEDA



JESSIE COHEN/NZP



MEHGAN MURPHY/NZP

→ HIDDEN gems

→ **BIRD HOUSE** Visitors naturally gravitate to the flamingos, but let's take a moment to visit their less showy but equally striking neighbor, the *blue-billed curassow* 8. One of the world's most endangered birds, the blue-billed curassow is imperiled by deforestation in its native Colombia. Less than 300 remain in the wild, and only a handful of zoos in the United States exhibit the species. The National Zoo is participating in a hormone study in hopes of breeding the birds, reports biologist Sara Hallager.

Farther along the path is the *whooping crane* 9, another endangered bird. Its outlook has brightened, thanks to extensive human intervention, such as using crane puppets to train hand-reared chicks to recognize their own kind. These North American birds have rebounded from a low of 21 individuals several decades ago to some 500 today. But don't expect to hear the male, Rocky, whoop. As a chick, he contracted a throat virus that left him mute.

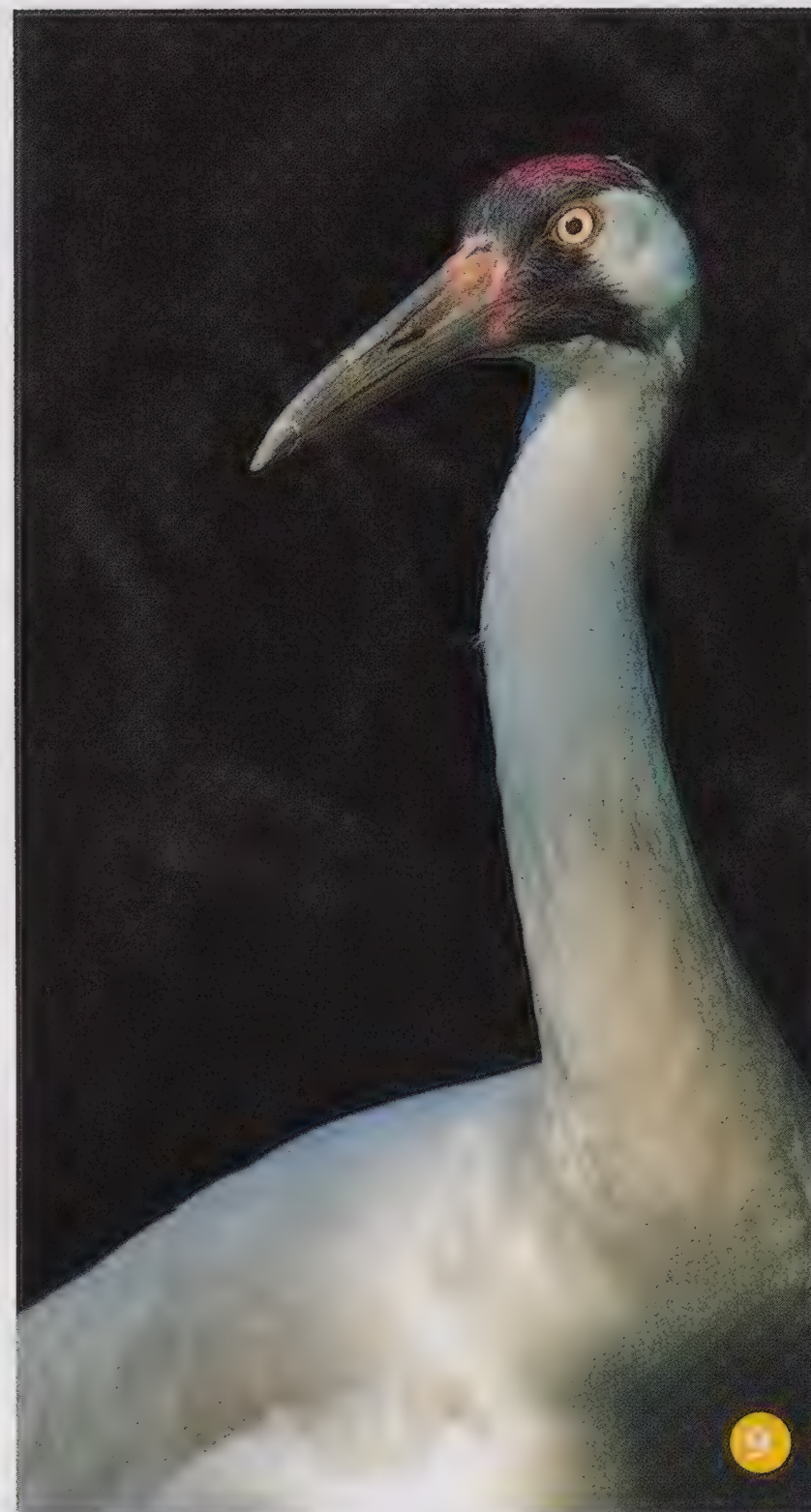


JESSIE COHEN/NZP



MEGHAN MURPHY/NZP

Inside the Bird House are two ordinary-looking birds with not-so-ordinary stories. The *Socorro dove* 10, which resembles a mourning dove, is extinct in the wild. The Zoo has successfully bred the birds for eventual release on the dove's native Socorro Island. The *swamp sparrow*, a relative of the song sparrow, is the subject of some intriguing research at



MEGHAN MURPHY/NZP

the Zoo's Migratory Bird Center. "Using thermal imaging, scientists have found that the sparrows are able to control body temperature through their bills," explains Hallager. "Also bill sizes and shapes change throughout the seasons, possibly because of competition for mates or changes in food resources."

→ **SMALL MAMMAL HOUSE** This might seem an odd place to look for an elephant's cousin, but the *rock hyrax* 11 is the closest living relative of elephants and manatees. Though it looks like an oversize guinea pig, its rodent-like teeth are believed to be remnants of tusks. Its toes and skull structure are also similar to an elephant's. In Africa, wild hyraxes love to sunbathe, and you may see them sprawled out on the rocks or trees in their Zoo habitat.

Two new inhabitants, exhibited for the first time at the National Zoo, are the *brush-tailed bettong* and the *Malagasy giant jumping rat*, both critically endangered. The bettong is a two-pound marsupial that resembles a miniature kangaroo. Like its larger relatives, it practices assembly-line reproduction: one baby outside the pouch, one baby inside the pouch, and one waiting to be born. The rabbit-size jumping rat is one of the world's largest species of rats and one of the few monogamous rodents. Also kangaroo-like, it uses its strong hind legs



JESSIE COHEN/NZP

to leap three feet in the air to avoid predators, says curator Steven Sarro.

→ GIBBON RIDGE AND LEMUR ISLAND

ISLAND Wandering off Olmsted Walk near the Great Ape House, we come to a large mesh enclosure. Here we meet the *white-cheeked gibbons* ¹² and *siamangs* ¹³, sometimes called lesser apes. Native to Southeast Asia, they are endangered due to loss of forest habitat.

“With their long legs and long fingers, they are well adapted for grabbing, swinging, and moving about,” says biologist Laurie Thompson. “They are graceful and very meticulous with their fingers, and like other primates, they have a lot of personality.”

These apes are also a noisy lot. When they call to one another, you can hear them throughout the Zoo. Early in the morning, when they first come out into the yard, is a good time to tune into their conversations. For maximum activity, visit around two in the afternoon, when keepers offer enrichment items.

Farther down Olmsted, we find Lemur Island with its dramatic waterfall. Look up in the trees or on the wooden platforms to spy *lemurs* ¹⁴, primitive primates native only to Madagascar and the Comoros Islands off the east coast of Africa. The ring-tailed lemurs, with their long black-and-white striped tails, are most striking.

Most lemurs are active in the day, but a few species are more adapted to a nocturnal life. All lemurs tend to retain iron in their bodies. This means keepers and nutritionists must carefully manage and monitor the animals’ diets to prevent iron storage disease.



MEGHAN MURPHY/NZP



MEGHAN MURPHY/NZP



MEGHAN MURPHY/NZP

→ HIDDEN gems ←



JESSIE COHEN/NZP

→ **REPTILE DISCOVERY CENTER** A masterpiece in brick, the Reptile Discovery Center (RDC) hosts a variety of creatures that are rapidly vanishing from the planet. They include the *Grand Cayman iguana* **15**—also known as the blue iguana because it turns bright blue when excited. It is one of the rarest lizards on Earth, numbering only a few hundred individuals in the wild.

RDC is also home to one of the few remaining populations of the *Panamanian golden frog*, believed to be extinct in the wild. Like numerous other amphibians, it has been nearly wiped out by a lethal fungus called chytrid. The Zoo has raised hundreds of these frogs as part of an international effort to save the species.

A new resident is the *indigo snake*, native to the southeastern United States. Large and impressive with lustrous, nearly black skin, this reptile is a fearless diner. It will eat anything it can hold onto, including its venomous cousins. Zoo specialists are working with a private foundation in Georgia to help save this endangered snake.

Don't leave RDC without stopping at the new Appalachian Salamander Lab, which highlights the plight of local salamanders. The Appalachian region has the greatest diversity of salamanders in the world, but they are rapidly falling victim to climate change, water pollution, and habitat loss. In the lab and in the field,



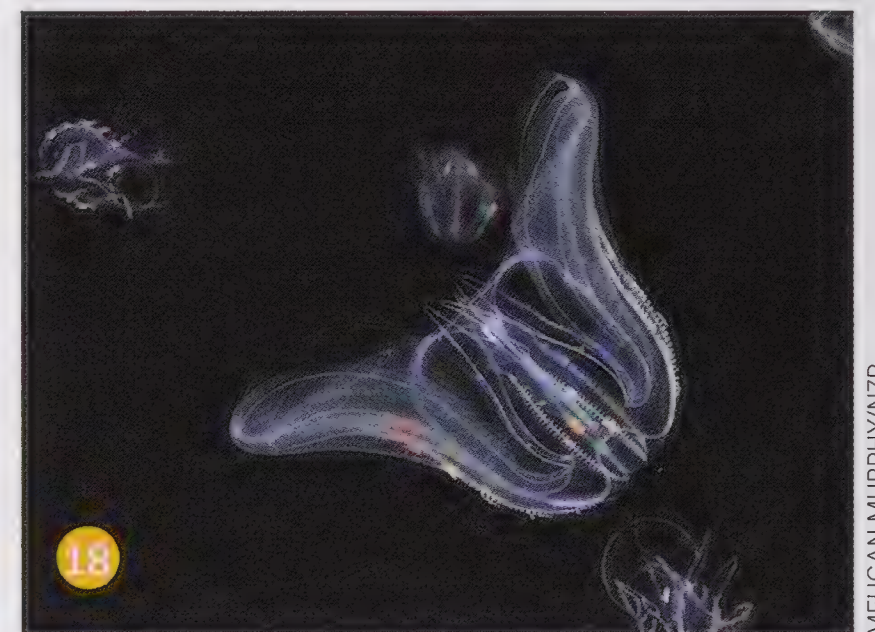
MEHGAN MURPHY/NZP

Zoo scientists are studying how environmental changes affect salamanders' reproduction and ability to resist disease. One of the featured animals in the lab is the *hellbender*, a cousin of the Japanese giant salamander that can grow two feet long.

"These are remarkable and beautiful animals and you should enjoy them for what they are," says curator Jim Murphy. "But it's important to realize that we are in the midst of an unprecedented extinction event. Projections are that within several decades, half of all amphibian species and half of our turtles could disappear from the face of the Earth. Populations of snakes that feed on amphibians also are beginning to crash."



MEHGAN MURPHY/NZP



MEHGAN MURPHY/NZP

→ **INVERTEBRATE EXHIBIT** Now let's step into the world of "the other 99 percent," as invertebrate keepers refer to the spineless creatures that make up the vast majority of animal life on Earth. We may need to look twice at the *Australian prickly stick insect* **16**, a rather prehistoric-looking fellow easily mistaken for a dried leaf.

Perhaps the most captivating of the resident insects are the industrious *leaf-cutter ants* **17**, which constantly parade through their exhibit toting small pieces of green leaves. "They're farmers," explains curator Alan Peters. "They have an elaborate system, chewing up leaves and defecating to create a mulch on which a specific kind of fungus grows. They feed on that fungus. It's a lot like our farming. There needs to be caring and tending for them to get food."

Across the aisle from the ants is a mesmerizing light show, courtesy of *comb jellies* **18**, clear creatures with the bell shape of sea jellies but without long tentacles. They refract light along their bodies as they circle gracefully through the water propelled by hundreds of tiny oar-like cilia.



→ **LION/TIGER HILL** Strolling along the shady path off the circle, we'll discover two of the more successful smaller cat species. The **caracal** 19, sometimes called the "desert lynx" because of the tufts of fur at the tips of its ears, roams across Africa and Central Asia. It is thought to use its tufted ears to communicate, to locate prey, and possibly to regulate its body temperature. The caracal also is a spectacular jumper, leaping up to ten feet in the air to catch birds on the fly.

Bobcats, new neighbors across from the caracals, "are a good example of wild animals right in our backyard," says curator Craig Saffoe. Preying on rabbits, voles, and mice, they have adapted well to living—and hiding—among people.

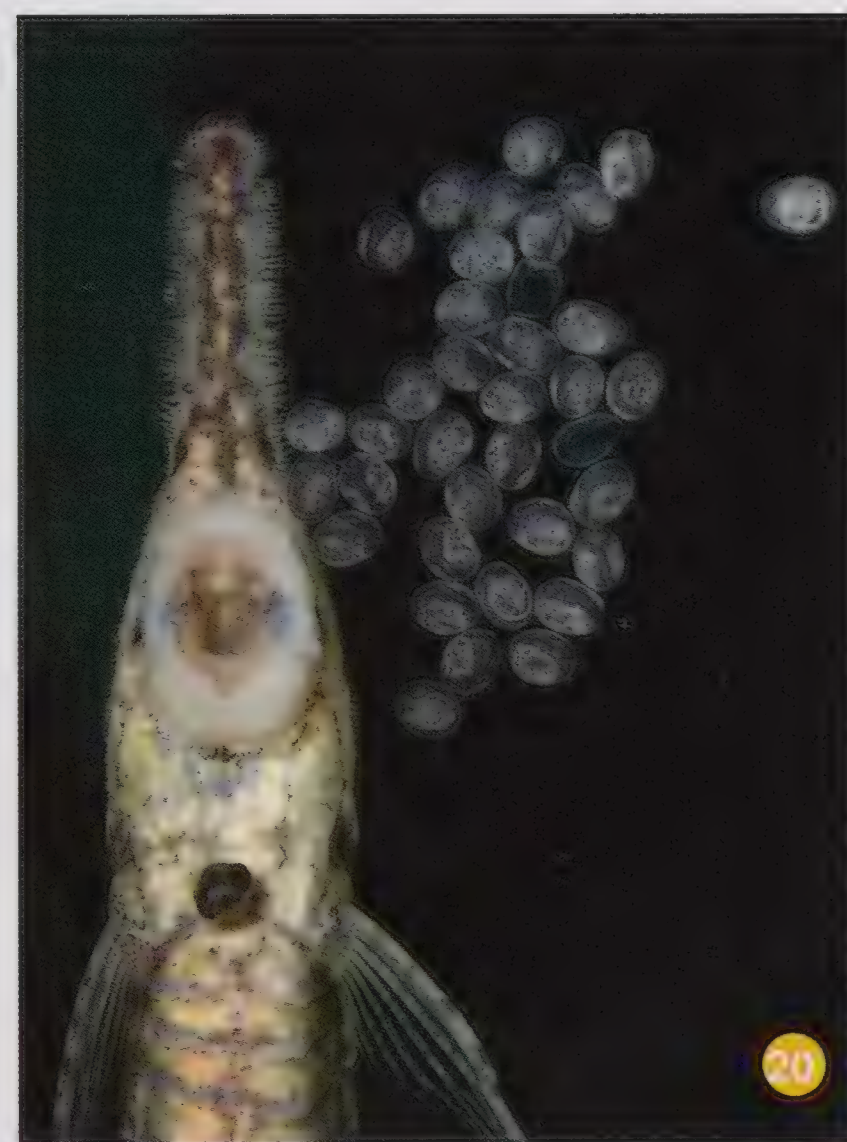
As you leave Lion/Tiger Hill, take a moment to drop by the **giant anteater**, an improbable looking creature well designed for both feeding and defense. The anteater uses its formidable claws to tear into rotten logs, termite mounds, and anthills. Then its sticky, two-foot-long tongue slurps up countless insects a day. "They are like tanks," says Saffoe, "difficult to prey on

because their skin is so thick. And the claws they use to hunt are also what they use to defend themselves against jaguars. An animal with no teeth that can defend itself the way an anteater can deserves a lot of respect."

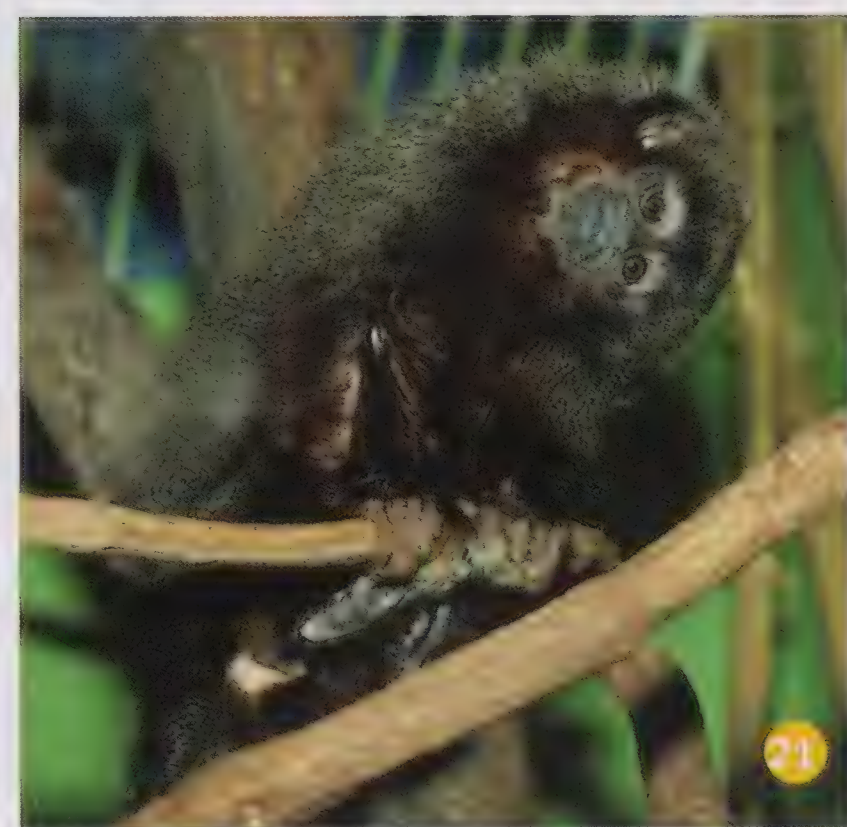
→ **AMAZONIA** Just inside the entrance to Amazonia, freshwater stingrays and a giant river fish, the arapaima, catch the eye. Walk on to the small tanks in the field station area and challenge your group to see who can be the first to find the **twig catfish** 20. This long, slender fish with a needle nose blends in remarkably well with the submerged twigs and pieces of wood on which it rests.

At the amphibian exhibit in the Amazonia gallery, *ooh* and *ah* over the neon-hued **poison dart frogs**. Then take a moment to appreciate the native frog exhibit, which showcases **tree frogs** and **wood frogs** common to our area. They too are at risk from environmental changes and the deadly chytrid fungus.

As you enter the rainforest on the upper level, gaze up in the trees and you may spot



MEHGAN MURPHY/NZP



JESSIE COHEN/NZP

the **Goeldi's monkeys**, which look like black tamarins, or the brownish **titi monkeys** 21. The titis form especially strong bonds, says curator Vincent Rico. When they sit or sleep together on a perch, they actually braid their tails together.

AND THAT'S NOT ALL... This is just a sampling of the hidden gems that make up the Zoo's diversity. Countless other creatures await your discovery. Primates curator Bob King, offers advice for seeking them out.

"Get off the main path, away from the crowds, and go down any of the pathways where you don't immediately see anything. Take time, look around, look up, and you'll be surprised at what you find." **SZ**

— *Longtime contributor* PHYLLIS MCINTOSH is a Zoo volunteer.



**One elephant.
One truck.
And more
than one thousand
miles to go.**

ELEPHANT ON BOARD

BY CRISTINA SANTIESTEVEAN

On May 21, 2013, a 37-year-old Asian elephant—Bozie—set out on a 1,100+ mile road trip. Her destination? The Smithsonian's National Zoo, where she would join resident elephants Shanthi, Ambika, and Kandula as the fourth member of the Zoo's elephant herd.

Bozie traveled in a 30-foot truck from the Baton Rouge Zoo to the Smithsonian's National Zoo. Her trip covered more than 1,100 miles, took more than 28 hours, and ended with a National Zoo police escort through the crowded streets of Washington, D.C.



CONNOR MALLON/NZP



ELEPHANT ON BOARD

Wide Load

Bozie weighs approximately 10,000 pounds. She traveled in a 30-foot trailer from Baton Rouge to D.C. Although the plan was for Bozie to ride facing the front of her trailer, she had other ideas, and chose to back into the truck.

On the Road

Bozie and her traveling companions hit the road at 11 a.m. on May 21. A professional animal transporter drove her truck, while one of Bozie's Baton Rouge keepers—Jenny Fortune—followed behind in a minivan with National Zoo veterinarian Nancy Boedeker and National Zoo elephant manager Marie Galloway. The van was loaded with supplies for both people and elephant, including Bozie's favorite treats—marshmallow Peeps.



NANCY BOEDEKER/NZP



NANCY BOEDEKER/NZP

Bozie quickly learned she could stick her trunk out the window, and spent nearly the entire trip riding like that. "It was both unbelievably cute and incredibly reassuring, because each time we saw her trunk, we knew she was doing fine," says Galloway.

A Family for Bozie

Elephants are social creatures; females live in large groups of mothers, daughters, sisters, and aunts. When Bozie's last companion—Judy—died in March, her keepers at the Baton Rouge Zoo began looking for a new home and family for Bozie. The timing was perfect with the opening of the Zoo's new, state-of-the-art Elephant Community Center.



NANCY BOEDEKER/NZP



NANCY BOEDEKER/NZP



Every now
and then
people would
notice Bozie's trunk
poking out of her window.
Some of them smiled, waved,
and took photos. They sure
had a good story to
tell their friends
and family!



ELEPHANT ON BOARD

Bozie will meet her new companions once she completes her standard 30-day quarantine period. One of those introductions will actually be a reunion. Bozie was born in Sri Lanka and lived briefly with Shanthi at the same elephant orphanage before both elephants moved to the United States. Will they remember one another? We don't know.

Packing List

What does an elephant need for a road trip? Bozie's packing list included a fully-stocked first aid kit, a flashlight, several bags of food and bales of hay, a bucket of fresh fruit, and a few packets of marshmallow Peeps—Bozie's favorite treat.

"She was a great traveler," says Nancy Boedeker, the Zoo veterinarian who



NANCY BOEDEKER/NZP



PAMELA BAKER-MASSON/NZP

accompanied Bozie on her trip. "The trip was uneventful. I didn't need to do a thing for Bozie, which is great because it means everything went as planned."

Home, Sweet Home

Bozie has happily settled in at the Elephant Barn. She enjoys rolling in the sand, working through her training routine, and getting to know the animal care staff at the Zoo. When Shanthi and Ambika are near enough to smell and hear, Bozie makes the low rumble sound that is elephant talk. We don't know whether she is talking to or about the other elephants, but she sure can tell when they are around! **SZ**

— *Freelance writer-photographer* CRISTINA SANTIESTEVEAN is a contributing editor to Smithsonian Zoogoer.



NANCY BOEDEKER/NZP



NANCY BOEDEKER/NZP

JENNY FORTUNE/BATON ROUGE ZOO



NANCY BOEDEKER/NZP



NANCY BOEDEKER/NZP



BOZIE SAYS THANK YOU!

The entire cost for Bozie's travel from Baton Rouge Zoo to the Smithsonian's National Zoo, her care during her transition to her new home, and the assistance from her longtime keeper was covered by FONZ. That means your membership fees and support of FONZ helped bring a new elephant to the Zoo. Thank you so much!

GREAT NEWS!

Bozie joined her new companions on June 27. Come visit Elephant Trails and the Elephant Community Center to meet her.

**Join us for a typical day
in the country.**

**A country with wicked
cool endangered animals
that is.**

Save the date for the Autumn Conservation Festival: October 5-6, 2013



TRICK OR TREAT WITH THE BEARS

CELEBRATE HALLOWEEN AT THE 15TH ANNUAL BOO AT THE ZOO!

With more than 40 treat stations, animal encounters, and decorated walkways, this safe and spooky event at the Smithsonian's National Zoo is fun for the whole family. Save the date: October 25-27, 2013.



BEAST BITS

Big Bite!

Gaboon vipers have the longest fangs of any snake. Their dangerous teeth grow to be as long as two inches, and deliver more venom than any other snake. Yet despite their potent bite, Gaboon vipers would rather just be left alone. These snakes rely on their camouflage to hide from prey and potential predators in the African rainforests they call home. *You can see a Gaboon viper in the Reptile Discovery Center.*



JESSIE COHEN/VNZP



MARK VAN BERGH

Busy Builders

Woodchucks can't chuck wood, but beavers can! North American beavers use their chisel-shaped front teeth—known as incisors—to cut down trees. Some they eat, and others they use to build dams and lodges, or homes. Beavers are the largest rodents in North America, and the second-largest in the whole world. *You can visit the beavers on American Trail.*



Elephant tusks are really overgrown incisor teeth. Male and female African elephants have tusks, while only male Asian elephants grow full-size tusks.

Fun fact



**CREATURE
FEATURE**

Looking **SHARP**

BY PETER WINKLER

One thing sticks out about prehensile-tailed porcupines. Can you guess what that is?

PRICKLY Characters

Prehensile-tailed porcupines are rodents that live in the forests of South America. Also known as Brazilian porcupines, they are one of 29 porcupine species. Porcupines live on every continent but Australia and Antarctica. They are generally nocturnal, sleeping by day and finding food by night.

Tough DEFENSE

Sometimes even quills aren't enough to scare an animal off. Then the porcupine tries Plan B—and C and maybe even D. It may stamp its feet, growl deeply, give off a high-pitched scream, shake its quills, or curl up into a ball. It may even try to bite its attacker. The object of these deadly games: staying alive.

A Tail THAT'S A TOOL

"Prehensile" means "able to grasp." Like howler monkeys, prehensile-tailed porcupines wrap their tails around branches. That helps them stay up in the trees, where they spend almost all their time. These prickly creatures can even hang from trees as they snatch leaves, flowers, fruit, and other food.

IS IT A BOY or a Girl?

Baby porcupines, called porcupettes, of this species look like orange balls of fluff. At birth, their quills are soft, but they harden within an hour. Male and female porcupettes look alike, but Zoo scientists can tell them apart by studying the DNA in their quills.

GET the Point?

Weighing just a few pounds, a prehensile-tailed porcupine could make a tasty snack for a predator in its forest habitat. But most animals think twice when they see the hard, pin-like hairs—called quills—sticking out from the porcupine's body. Would-be predators usually give up and look for another meal.

At the ZOO

You can see a prehensile-tailed porcupine at the Small Mammal House.

**YOUR
TURN**

Baby Names

Young porcupines are called **PORCUPETTES**. Here are five other animals with unusual names for their young. How many do you know?

ELEPHANT
HORSE
KANGAROO

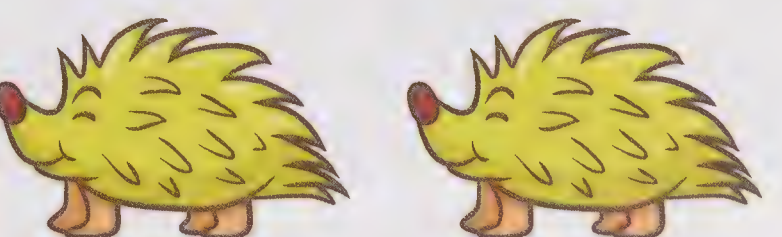
GOAT
GOOSE

Calf; Foal; Joey; Kid; Gosling

ANSWERS:



JESSIE COHEN/NZP



On Asia Trail

Zoo keeper Courtney Janney always knew she wanted to work with animals. She assumed that meant she would need to be a veterinarian. It wasn't until Janney was a senior in college that she realized veterinarians are not the only professionals who spend their days with animals.

"I was not interested in a desk job," says Janney. "I didn't want to wear clothes that required dry cleaning. I wanted to be outside, and I wanted to be working with animals."

Now, Janney is one of eight keepers working on Asia Trail at the Smithsonian's National Zoo. And, yes, she spends most of her days outside working with animals.

Waking, Walking, and Working

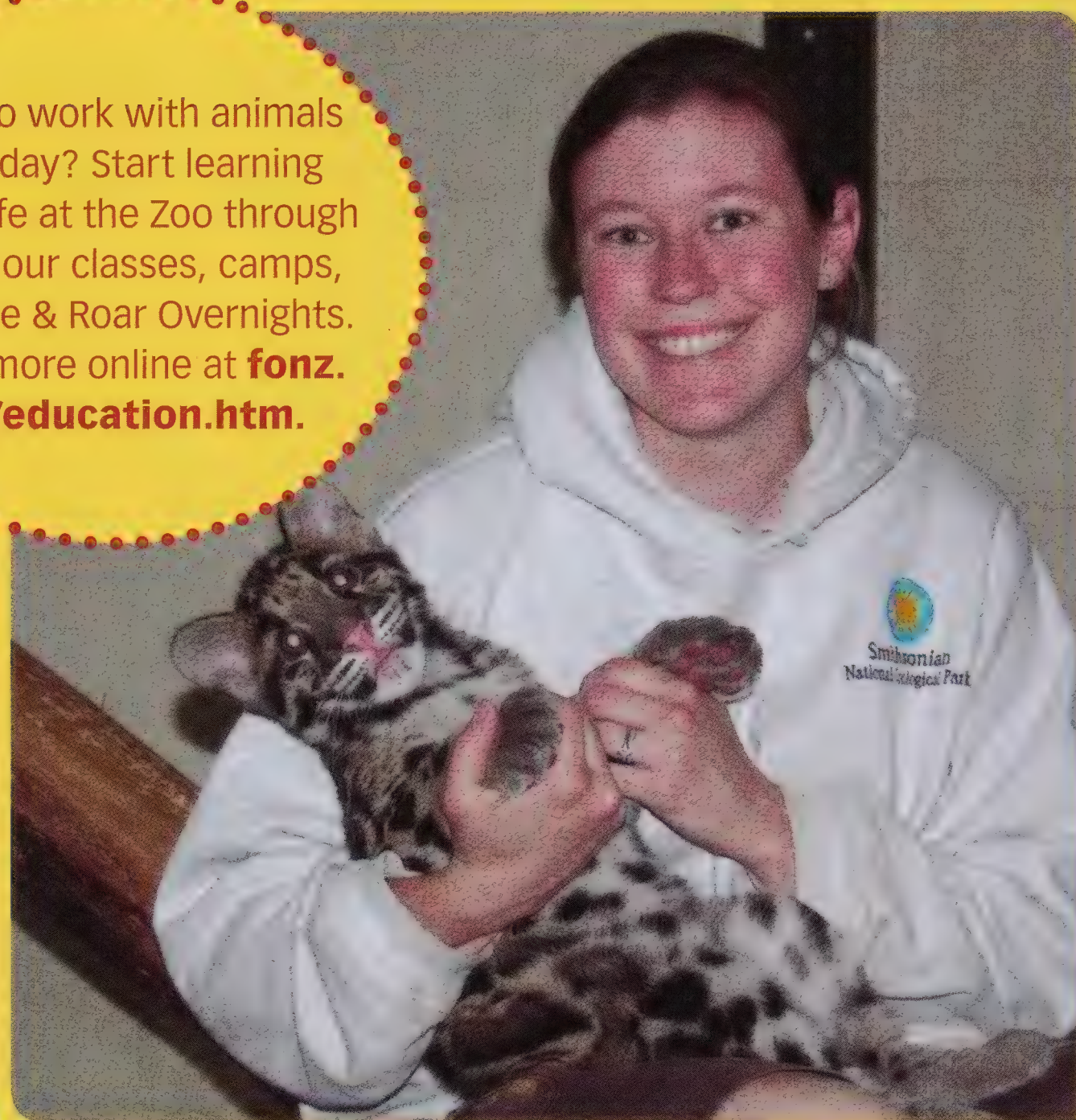
Working as a zoo keeper can require an early morning alarm, explains Janney. "A typical day for me is waking up very early and getting in here by 6:30. Then, I'm on my feet all morning: feeding, cleaning, training, and taking care of the animals. I usually work the line we call 'down the hill,' which is cats and otters and red pandas."

A "line" is zoo keeper speak for a collection of animals that are cared for together. There are three lines on Asia Trail: giant pandas, sloth bears, and "down the hill," which includes clouded leopards, fishing cats, Asian small-clawed otters, and red pandas. On any given day, a keeper will work one of those lines or will serve as backup for the other keepers.

Musical Bears and Trainable Tails

A large part of Janney's job involves training the animals so that their medical care is easier for them and their caregivers. For example, Janney is teaching the clouded

Want to work with animals someday? Start learning about life at the Zoo through one of our classes, camps, or Snore & Roar Overnights. Learn more online at **fonz.org/education.htm**.



leopards to stick their tails out beneath the mesh of their enclosures. Once the leopards master this skill, Zoo veterinarians will be able to use their tails to more easily collect blood samples and take blood pressure readings.

The training sessions are going well, says Janney. "They know if they give me their tail and let me touch it for as long as I want, they get a meatball."

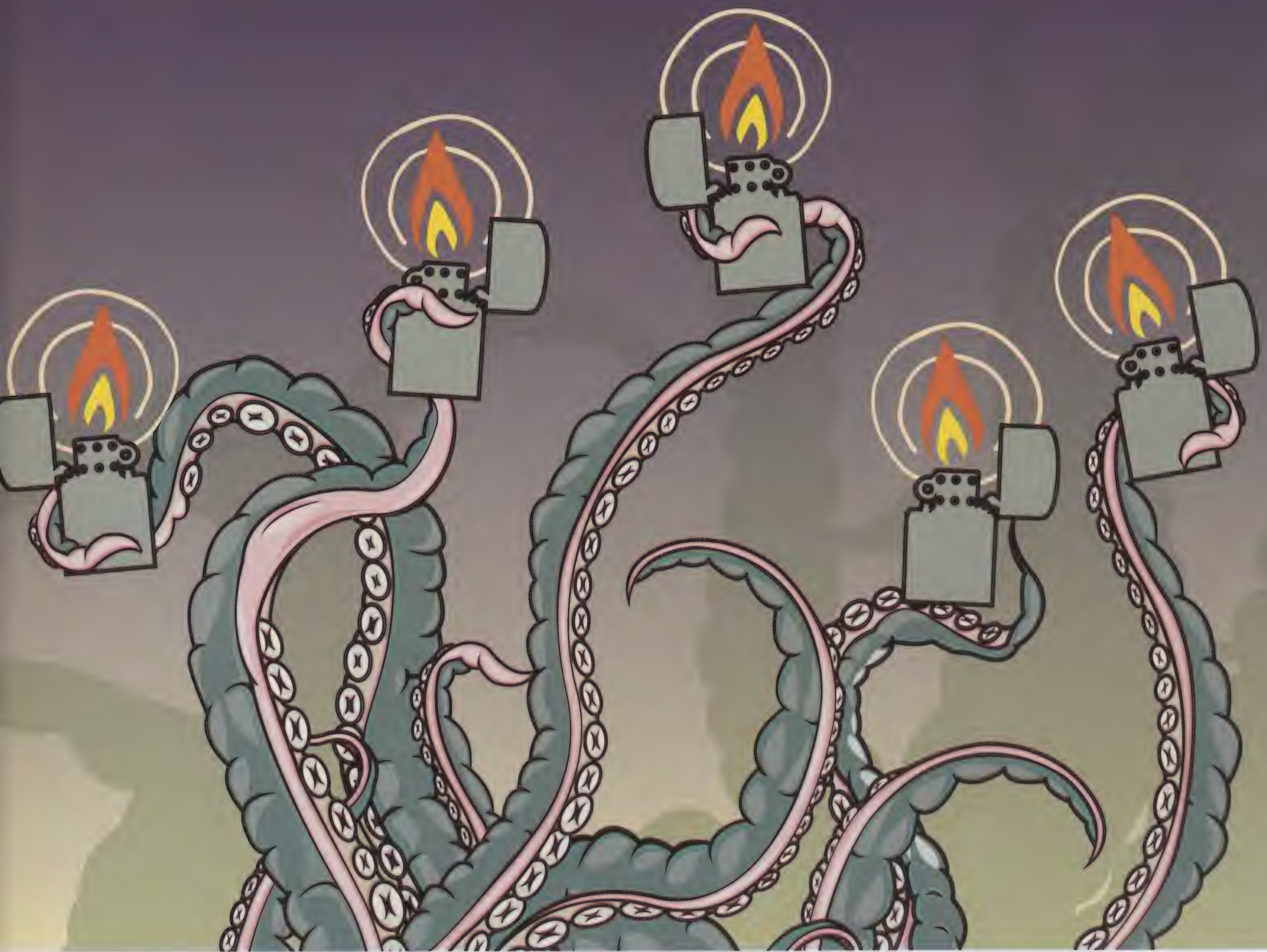
But sometimes these training sessions are really playing sessions. "The sloth bears are so intelligent that we train them just for fun sometimes," says Janney. "It's all built around their natural behaviors. Sloth bears like to suck and blow. So why not ask them to suck and blow through a harmonica? They really enjoy it."

Work or Play?

Janney loves her job, and it shows. "My husband always says, 'It's not work, because you love it too much.' And he's right. I do."

If you want to work with animals as well, Janney has some advice to share: "Get involved at whatever level you can. Most zoos accept volunteers or have camp programs. Obviously, study hard. Then go to college for what you have the passion for."

— Cristina Santiestevan



GET READY TO ROCK! Rock-N-Roar 2013 is coming to the Smithsonian's National Zoo on September 6. Follow us on Facebook and Twitter for the latest news, band updates, and ticket information. We will rock you. **Fonz.org/rocknroar**
This event is generously supported by lead sponsor Whole Foods Market® as well as Chipotle Mexican Grill, 94.7 Fresh-FM, and the Marriott Wardman Park Hotel.

FONZ RESOURCES

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Please email us at
fonzmember@si.edu

Not a FONZ
member yet?

Call 202.633.2922
or go to
fonz.org/join

When you support FONZ, you support the Zoo.

In 2012, Friends of the National Zoo generated approximately \$17 million from signature Zoo events (such as Boo at the Zoo, ZooFari, and ZooLights), camps and classes, retail sales, parking, volunteer training, event catering, and guest services. Your generous contributions to these activities and your direct support as FONZ members enabled us to provide the Zoo with nearly \$4 million to help sustain its animal care, research, education, and conservation work.

Thank you for
your passionate support!

¹ Does not include restricted funds raised that went directly to the Zoo.

² Development transferred to the Zoo in 2012.

FINANCIAL REPORT

2012

2011

Membership	\$2,407,896	\$2,342,279
Contributions	\$137,003	\$168,028
Sponsorship	\$611,750 ¹	\$664,769
Visitor Services	\$10,701,153	\$12,647,037
Events	\$1,951,837	\$1,728,924
Education, Programs & Volunteers	\$870,753	\$867,051
Investments	\$251,881	\$(8,902)
Other Revenue	\$152,492	\$141,748

TOTAL SUPPORT & REVENUE	\$17,084,765	\$18,550,934
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Membership	\$978,683	\$922,835
Development	\$2,959 ²	\$216,510
Sponsorship & Marketing	\$588,604	\$600,407
Visitor Services	\$7,295,050	\$9,557,343
Events	\$1,558,909	\$1,546,023
Communications	\$481,003	\$642,795
Education, Programs & Volunteers	\$1,331,050	\$1,489,617
Finance, Administration & Business Support	\$457,569	\$681,727
Loss on Disposal of Property & Equipment	\$159,562	

TOTAL OPERATING EXPENSES	\$12,853,389	\$15,657,257
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Support to NZP and SI	\$3,940,476	\$2,537,712
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TOTAL EXPENSES	\$16,793,865	\$18,194,969
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CHANGE IN UNRESTRICTED NET ASSETS	\$290,900	\$355,965
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**Thank you to all
of our
2013 ZooFari
wineries!**

Barefoot Wine
& Bubbly

Barrel Oak Winery

Boxwood Estate
Winery

Constellation
Brands

Deutsch Family
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Early Mountain
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Hope Family Wines

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Vineyards

J. Lohr Vineyards
& Wines

Natura

Oyster Bay Wines

Ste Michelle Wine
Estates

The Seeker

FONZ Call for Board Nominations

Friends of the National Zoo seeks nominations for the Board of Directors. The volunteer Board plays an essential role in guiding FONZ's efforts and shaping our future, and we rely on our members to recommend individuals with the appropriate skills, talents, and leadership abilities.

Please assist by nominating individuals (including yourself) who you believe would be interested in this very special opportunity. The FONZ Board's Oversight and Nominating Committee will review nominations and select candidates to be voted upon by members this fall.

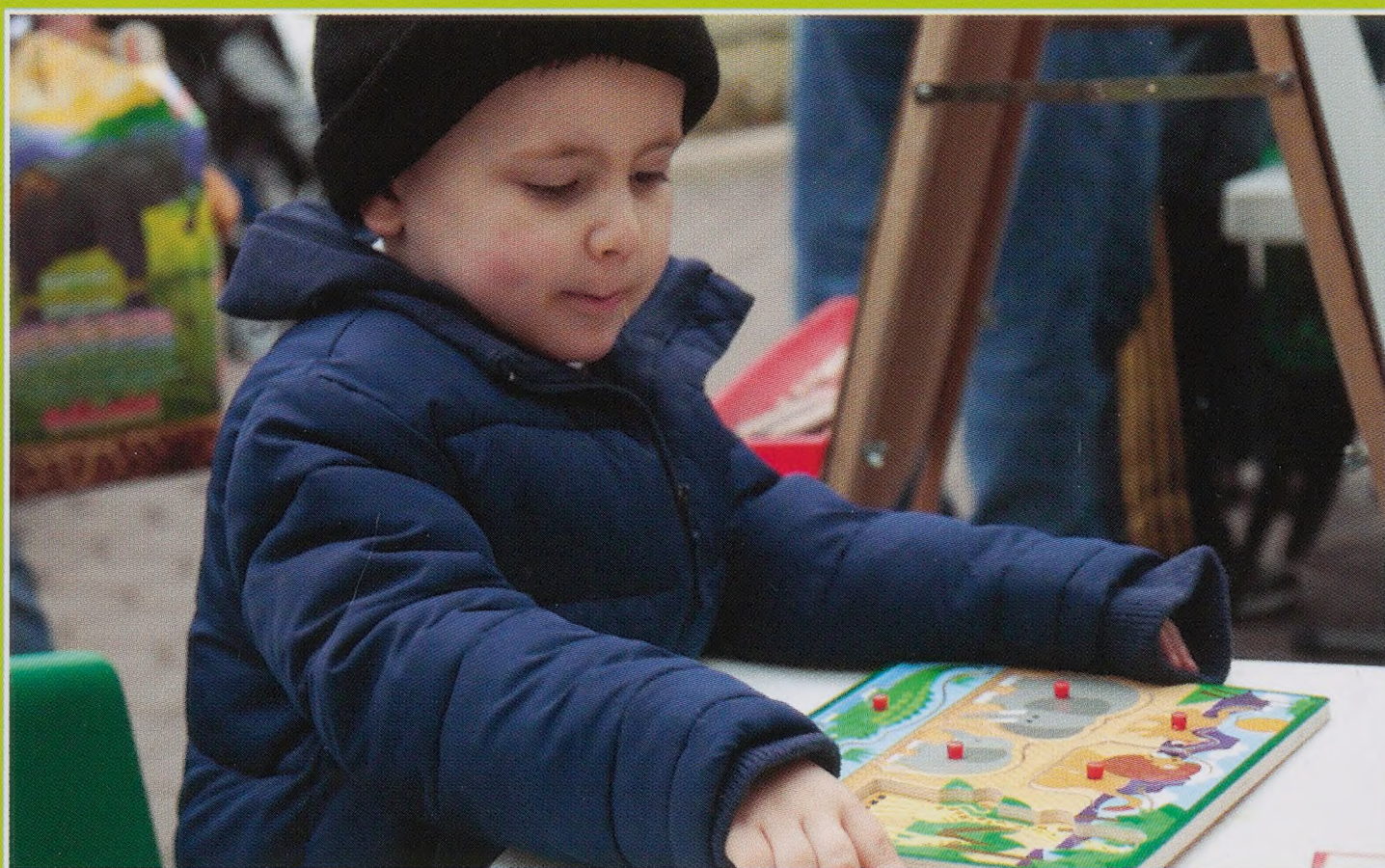
Nominations for the FONZ Board of Directors are accepted only from current, dues-paying members. They must be submitted on the FONZ nomination form and include a comprehensive biography. To receive a form and/or to discuss Board service, please call 202.633.4379.

The deadline for nominations is August 5, 2013.

From Andean bears to zebra
long-wing butterflies!

Calling All Kids

for the Wildest Educational
Opportunity in Town.



Snore & Roars are not just for kids!

Adult-only programs include wine and cheese; a two-hour, keeper-led tour; flashlight tour of the Zoo; a breakfast snack; and an engaging activity.

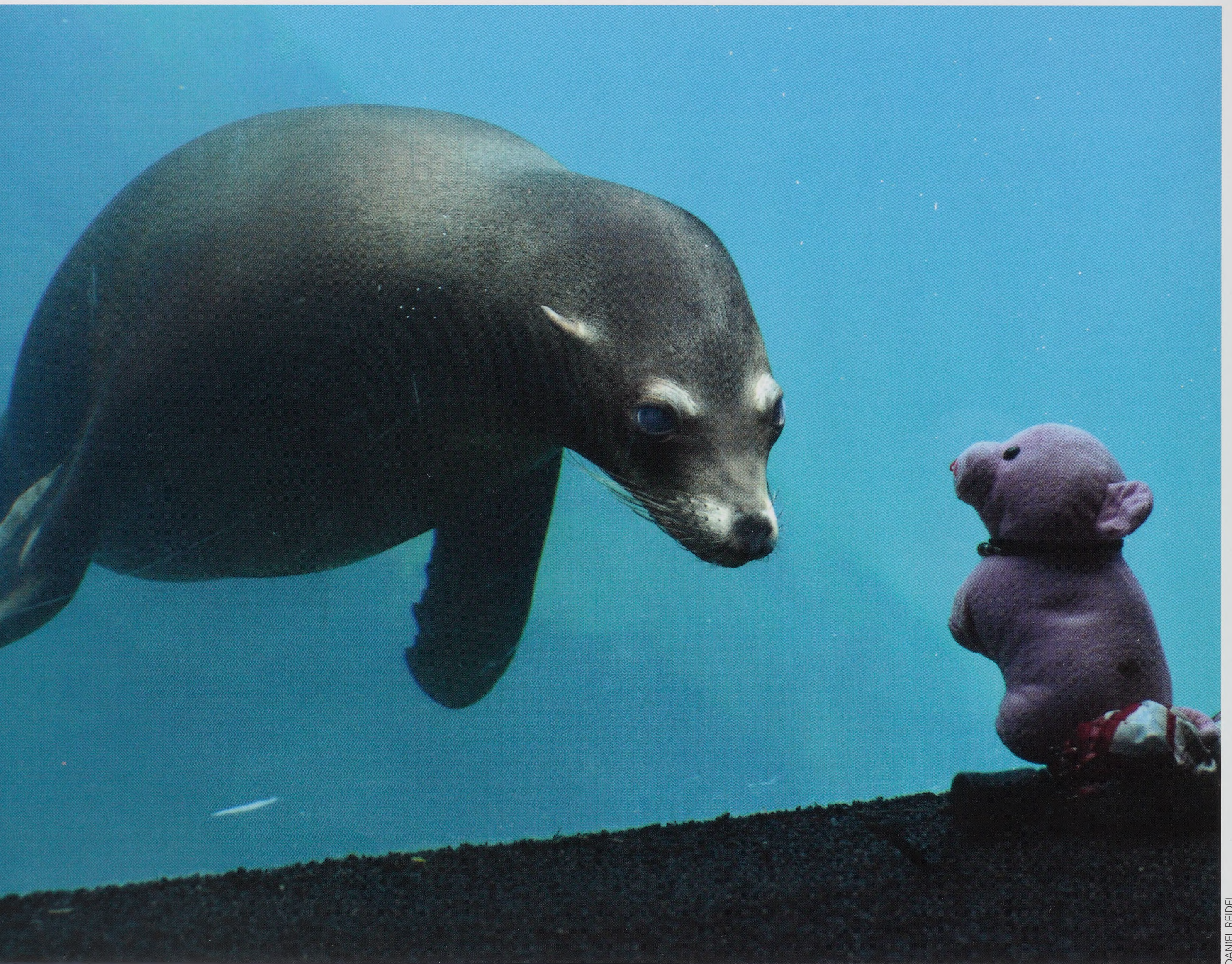
When you register your children for an award-winning FONZ class, you're signing them up for an exploration of the natural world that encourages curiosity, learning, and discovery.

Check the FONZ website for our latest class listings: fonz.org/classes.

Lions and Tigers and Campers, Oh My!

Sleep under the stars and wake to the early morning sounds of the Zoo. Overnights include a two-hour tour of one or more exhibit areas, followed by a flashlight tour of the Zoo in search of nocturnal animals and a campout on Lion/Tiger Hill. In the morning, your adventure concludes with a breakfast snack and family-friendly activity.

Snore & Roar overnights run through September. Find overnight listings, descriptions, and details at fonz.org/snoreandroar.



DANIEL REIDEL

Who's on Exhibit Now?

Visitors think they watch Zoo animals, but human eyes aren't the only ones at work. FONZ Photo Club member Daniel Reidel discovered that one rainy morning on American Trail.

"I noticed a woman with a small pig plushie," he recalls. "She was holding it in front of the window while walking back and forth. Sophie, one of the sea lions, kept following the pig."

"I fired off multiple shots, hoping one would turn out. When the woman finally walked away, Sophie went back to swimming. It was a beautiful sight at the Zoo."

Technical Notes —

CAMERA: Nikon D7000; EXPOSURE: 1/60 sec at f/4.5;
FOCAL LENGTH: 110 mm; ISO: 400

Smithsonian Zoogoer

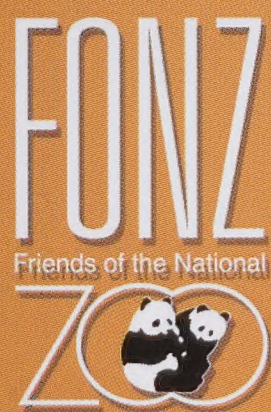
welcomes FONZ members' submissions of photos taken at the Zoo. Please send photos to **Zoogoer@si.edu**. We will contact you if we are able to use your picture for the Zoo View page.

Join the Club!

Membership in the FONZ Photo Club is open to photographers of all skill levels. The group meets monthly to hear guest speakers and to share and discuss members' work. Learn more at fonz.org/photoclub.htm.

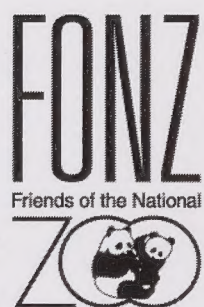
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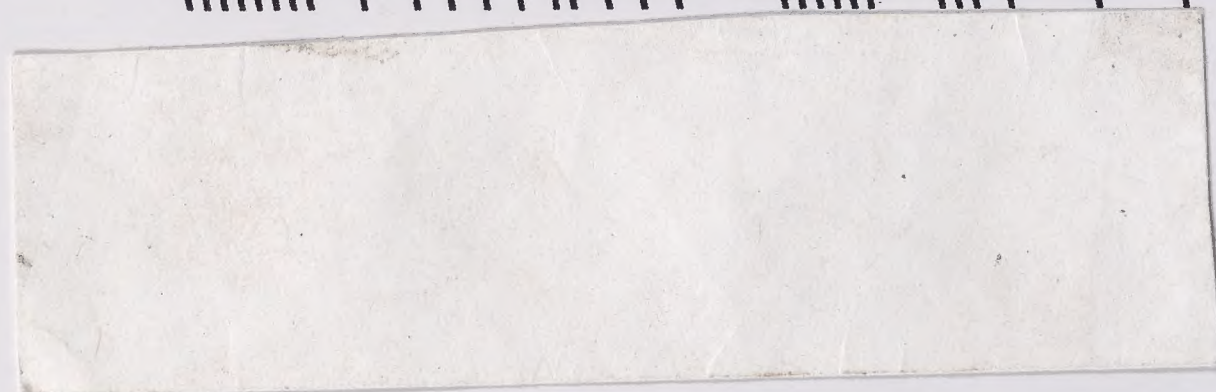
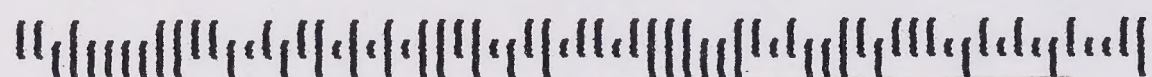


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